

## AN ASSESSMENT OF THE PSYCHOLOGICAL UNDERTONES TO ACCIDENTS IN MANUFACTURING INDUSTRIES

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### ABSTRACT

*To err is human. This apparently explains the occurrence of accidents in manufacturing industries around the world. The study reviewed notable empirical findings on the psychological undertones to the causes of accidents in manufacturing industries in the past ten years. Documentary cum content analyses methods were adopted. The study spanned Nigeria, United Kingdom, Spain, India, Malaysia and Thailand. The core research questions are: What are the categories of factors responsible for accidents in manufacturing industries? What proportion of the various factors attributed for accidents in the manufacturing industries are psychological? What are the psychological factors responsible for accidents in manufacturing industries. Some of the categories of causes found were: financial, mechanical, and psychological. Seventy-three percent [73%] of the identified causes of accidents in manufacturing industries had psychological undertone, and virtually all these causes were preventable. It was therefore recommended that concerted efforts should be made to evolve valid psychological instruments for collating the prevalence and causes of accidents in manufacturing industries around the world; there should be more astute psychological screening of factory managers and proprietors for mental health; and there should be regular psychological training to build the cognitive, emotional and social intelligences of key players in manufacturing industries to circumvent the occurrence of accidents in manufacturing industries around the world.*

**KEYWORDS:** Assessment, Psychology, Manufacturing Industry, Accidents & Causes

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### 1. INTRODUCTION

Several studies have been conducted on industrial and residential matters in recent past (Hossain and Alam, 2013; Omole, Adekunle, Ndambuki, Ogbiye, Onakunle, and Emenike. 2018; Elemile, Raphael, Omole, Oloruntoba, Ajayi and Ohwayborua, 2019; Odukoya, 2019a)[1-4]. Some of these authors focused on accidents and its implication on mankind. Accidents are almost inevitable amongst homo-sapiens and it takes different forms which include: automobile accidents, flight accidents, sailing accidents, domestic accidents, accidents on construction sites, accidents in manufacturing industries, to mention but few. However, this paper is focused on psychological precursors of accidents in manufacturing industries. What is the prevalence of accidents in manufacturing industries

around the world? What are the factors responsible for accidents in manufacturing industries? What proportion of the factors attributed for accidents in the manufacturing industries are psychological? What are the dimensions of psychological factors responsible for accidents in manufacturing industries? Which of the psychological precursors of accidents in manufacturing industries are preventable? These are some of the research questions this study addressed.

The Oxford Dictionary (2019) [5] defines accident as a spiteful incident that ensues suddenly and results in wound / damage / death. Authors such as Omonijo, Obiorah, Uche, Anyaegbunam, Shaibu, and Ogunwa, (2017)[6] consider accident as an aspect of indirect insecurity challenging many people in developing countries and its occurrence more often than not, has been attributed to technical faults, error of judgment, lack of experience and emotional/mental instability by scholars such as (Layanun, 2004; Tungjiratthitikan 2017)[7-8].

The effect of accidents on individuals, families, and the nation could be colossal. In some cases, multi-million dollar industries are razed down thus leading to loss of means of livelihood for many families. This could further lead to divorce, single parenting, poor malnutrition, school drop-out, social miscreants, and related social vices. Where companies are not badly destroyed, workers could be maimed or disabled such that they may have to be laid off. The effect on the family of the affected person is virtually same as enumerated earlier.

Accidents in manufacturing industries could also lead to loss of income cum unbudgeted expenses for the company. The incident could therefore lead to increase in cost of production, which in turn could lead to increased selling price. If the company product or service is not having a competitive edge over its contemporaries, this may result in loss of customers and profitability. Such companies may decide to lay off workers, thus re-enacting the vicious circle earlier painted. The effect of accidents in the workplace, especially in manufacturing industries could be devastating with undesirable short and long term effects for individuals and for the nation.

From these submissions, it is apparent that accidents –major or minor – should be prevented by all means. This review exercise is a step in this direction. A clearer understanding of the causes of accidents in manufacturing industries, especially those bordering on psychological reasons, is likely to facilitate the derivation of more pragmatic solutions to the challenge. It is therefore important that a synthesis of previous empirical researches done on this subject be made, to delineate the major findings in line with the outlined research questions above.

## 2. METHODOLOGY

This study adopted documentary analysis *design*. According to Bowen (2009) [9], document analysis is a form of qualitative study in which documents are interpreted by the researcher to give meaning around an assessment topic. The goal of this review is to highlight the prevalent findings from notable empirical studies conducted on this subject. Ten (10) investigated accidents were considered enough for this purpose (Kines, 2002 and Kjellén, 2000) [10&11].

### 2.1 Inclusion Criteria

The study must be empirical, and should be focused on causes of accidents in manufacturing industries. The document should be published in SCOPUS indexed scientific journals and it should be written in English.

Initial Search [Scopus indexed articles]	1,711
Open Access Articles	161
Articles in English language	152

Studies focused on causes	55
Studies with psychological causes	10

### 3. REVIEW/RESULTS

#### 3.1 Indian Apparel Factories' Accidents

In a study of eight finished apparel factories owned by an Indian exporter, Calvin and Joseph (2006) [12] reported that 96 out of 3,828 employees were involved in accidents to date. Women constitute about 80% of the industrial workforce (Kruijtbosch, 2004) [13].

Could age factor be contributory to accidents in manufacturing industries? It was found that 41.6% (37) of the reported accidents involved workers between 21 and 25 years of age. This was the most prevalent group in the reported accident cases. This was followed by ages 18 to 20 (23.6%) and ages 26 to 30 (18%). *This suggests that more of the younger workers were involved in occupational accidents than matured workers* in this setting. The statistics further shows that the *prevalence of accidents was higher for female workers than for males* (61 out of 89 cases). Punctured wound was the most prevalent form of injury (48.3%), with needle entering the phalanx while stitching. The other injuries were incised wound (28.1%), deep injury (13.5%), burns (5.6%) and foreign objects entering in to the body (4.5%). An assessment of the accident cases via in-depth interview showed that 85 out of the 89 accidents could have been avoided with modification of human behavior and adjustment of machines.

##### 3.1.1 Causes of Accidents

It was observed that 64 out of the 89 accident victims interviewed did not wear the protective device given because they felt it was uncomfortable. Apparently, they were confident they would be careful while stitching and are not likely to suffer accident. This is often the commonest psychological reason for accidents in virtually all areas of human endeavor - *overconfidence*. Another observed cause of accident was *frequent change of machines* used. Furthermore, 28 (31.5%) of the accidents were attributed to *unsafe condition of the machines*, particularly the absence of the needle guards. Sixty-nine (69) workers (77.55%) agreed that the accident could have been avoided by change of human behavior and attitude, while 9 workers (10.1%) said that it could have been avoided by change or regular servicing of mechanical gadgets. In a similar study in Thailand, it was found that the causes of accidents were largely due to workers *ignoring the use of safety devices* and *poor stress management* (Layanun, 2004) [7].

#### 3.2 Fire Disaster at Tazreen Fashions Ltd, Bangladesh

In a study of two notable accidents in history, Chowdhury and Tanim (2016) [14] reported on the Tazreen Fashions Limited and Rana Plaza Ltd in Bangladesh. *Tazreen Fashions Limited* in Bangladesh, established in 2010, employs 1,500 workers. It produces apparel for Dickies, Disney, Carrefour, El Corte Ingles, Delta, Edinburgh Woollen Mill, Piazza Italia, Teddy Smith, Walmart, and the U.S. Marine Corps (Bergman and Rashid, 2012; Mosk, 2012) [15, 16]. Fire broke out around 7pm on November 24, 2012, while the factory was in operation. It was estimated that 124 workers died in the inferno while 300 were injured (Ahmed, 2012; Bergman and Rashid, 2012; BBC, 2013a) [17, 15&18]. At least 1200 people were in the 9-storey building when the fire began (AMRC, 2013) [19]. Fire Fighters officials affirmed that the fire broke out on the ground floor, where piles of fabric and yarn were stored. Ideally, such materials should have been stored in fireproof rooms. Consequently, the negligence aided the attendant blaze which quickly spread across the ground floor to the upper floors. Because the factory lacked a sprinkler system and fire exits, many employees who tried to escape via the locked

interior staircase were trapped (CCC, 2013) [20]. Virtually, all the doors on all the floors of the 9-storey factory were locked. The smoke-filled staircases coupled with iron grilles on the windows made it impossible for the trapped workers to escape. Few desperate workers managed to break windows to escape, while others jumped from the upper floors to the ground, which left them badly injured or dead. It was reported that the Manager on duty, initially ignored the fire alarm sound, insisting the workers should return to work. The delayed response apparently aggravated the disaster. Workers who could not escape from the fire were burnt beyond recognition (Bajaj, 2012) [21].

### 3.2.1 Causes

An official of Bangladesh Fire Service attested that most of the workers died due to lack of adequate exits and suffocation by smoke. They also observed that the factory lacked CCTV monitoring system and had not renewed its operating license (Bustillo *et al.*, 2012) [22]. Bangladesh Occupational Safety, Health and Environment (OSHE) foundation also conducted an independent investigation to ascertain the root causes of the accident. Some of the major causes identified were: lack of emergency exits; provision of only one main entrance on the ground floor which was not wide enough to allow for quick escape by the teeming number of workers; inadequate fire extinguishers and fire defense materials; factory owner's negligence with regard to following the building code (constructing a 9-storey building when there was permission for only three floors); raw materials storage on the ground floor in close proximity to high voltage electricity transformers; expired fire safety certificate; and lack of adequate fire safety training, with only 40 out of the 1,500 workers participating in the basic fire safety instruction program (AMRC, 2013) [19]. Consequently, the available fire extinguishers in the factory were not used during the incident. It was apparent the factory management displayed gross irresponsibility and severe negligence in understanding and applying the occupational health and safety (OHS) guidelines.

### 3.3 The Collapse of Rana Plaza, Bangladesh

*Rana Plaza* was a 9-storey commercial building, located in Savar, Greater Dhaka. The building accommodated 5 clothing factories, with at least 5,000 workers on different floors. It also housed several shops and a bank. The 9th floor was under construction at the time of the accident. The factories manufactured apparels for 28 retailers from Ireland, Spain, the UK, Canada, Italy, and the USA. Their brands include: Benetton, Bonmarché, El Corte Ingles, Joe Fresh, Mango, Matalan, Primark, The Children's Place, and Wal-Mart (Luckerson, 2013) [29]. The building was owned by a leading member of the ruling political party, the Awami League (BDnews24, 2013) [23]. The building collapsed around 9am of April 24, 2013, with 1,129 deaths and 2,512 badly injured. 2,438 workers were rescued alive from the rubble and a large number of people remain missing (Alam and Hossain, 2013; Butler, 2013) [24&25].

#### 3.3.1 Causes

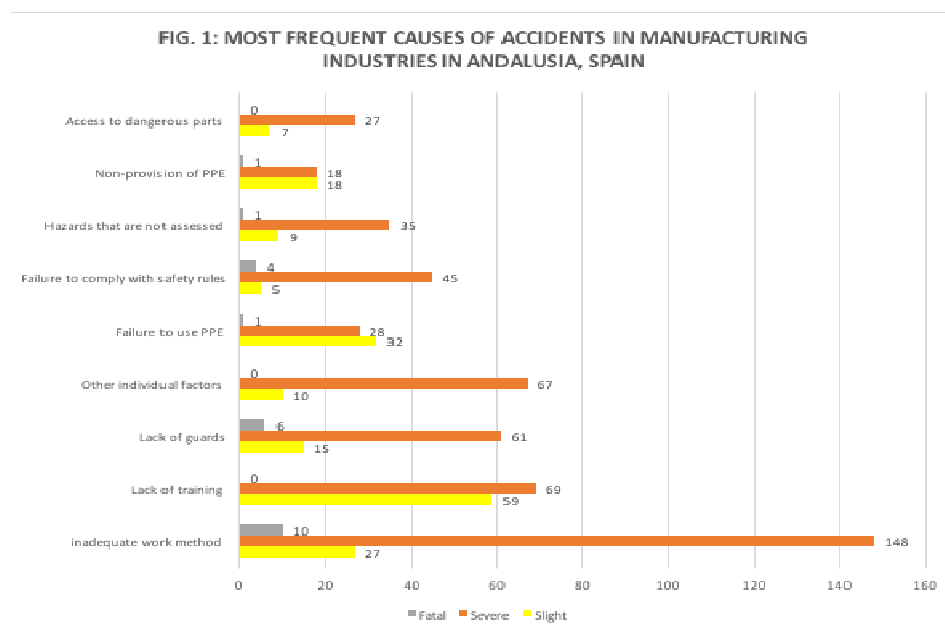
The preliminary report from Government's inquiry revealed that the installation of heavy machineries and high-capacity generators on weak deckings, and the use of substandard construction materials for building were largely responsible for the collapse. Furthermore, the top three floors of the 9-storey building were added without permission of the planning authority. The building was also constructed on marshland (Campbell, 2013) [26] & (Hossain and Alam, 2013) [24].

A number of officials reported that the building showed cracks a day before its collapse, but Sohel Rana, the owner of the factory, dismissed it as nothing serious. He later announced to the media that the building was safe to use and the workers should return to work (Libcom, 2013) [27]. Sohel Rana was reported to have told the workers on the morning of the disaster, *'The building is strong enough to last the next 100 years, so get back to work. Nothing will happen to you'*

(Clothes to Die For, 2014) [28]. However, the bank managers and shop owners took the cracks seriously and kept their respective offices closed on the day of the collapse.

### 3.4 Most Frequent Causes of Accidents in Manufacturing Industries in Andalusia, Spain

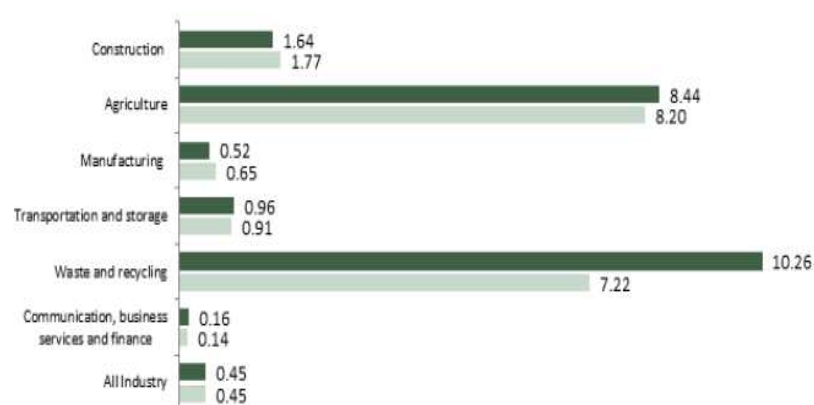
Carrillo-Castrillo, Rubio-Romero and Luis Onieva, (2013) [29] investigated the most frequent causes of severe and fatal accidents in manufacturing sector in Andalusia, Spain and found that: inadequate work schedule the tend to stress workers caused 148 severe accidents; followed by lack of training, which caused 69 accidents; individual factors caused 67 severe accidents; lack of guards caused 61 severe accidents; while failure to use personal protective equipment[PPE] caused 28 severe accidents. These are all psychological related factors that are preventable.Details of these data are in Figure 1 below.



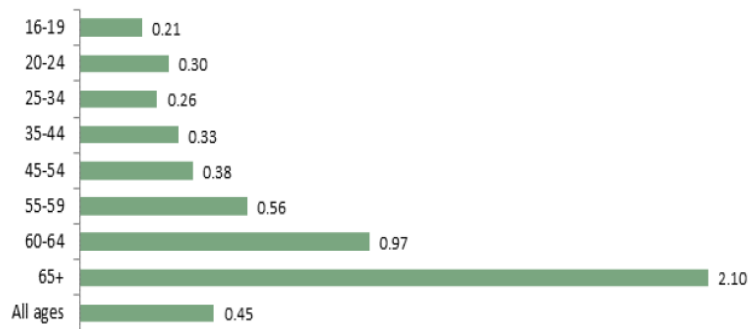
**Figure 1: Most Frequent Causes of Accidents in Andalusia, Spain.**  
Source: Carrillo-Castrillo *et al* (2013) [29]

### 3.5 Accidents in Manufacturing Industries in Great Britain

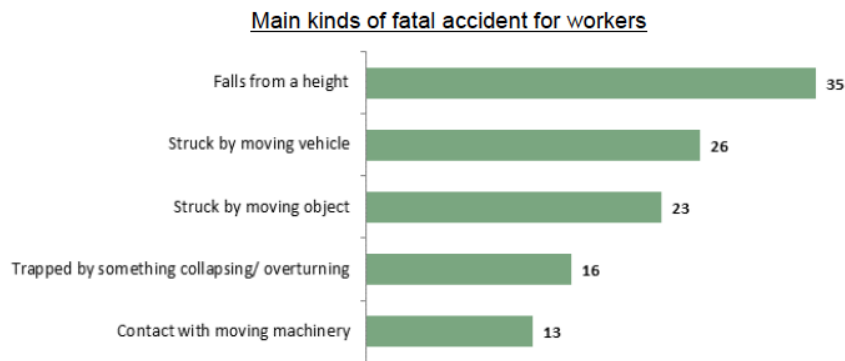
Health & Safety Executive (2018)[30] published incidences of workplace fatal accidents, that were reported to record authorities in 2017/18 in Great Britain [GB]. Below are charts of the data furnished:



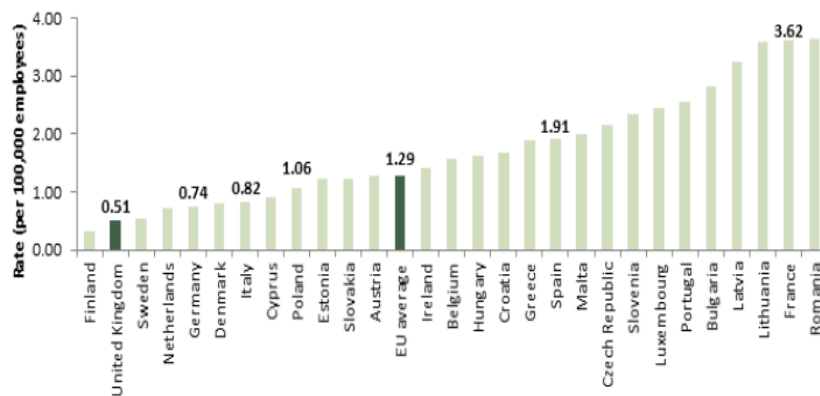
**Figure 2: Rate of Fatal Injuries by Selected Industry Group [Per 100,000 workers] in GB.**  
Source: Health & Safety Executive (2018) [30]



**Figure 3: Rate of Fatal Injuries by Age Group in GB.**  
Source: Health & Safety Executive (2018) [30]



**Figure 4: Main Kinds of Fatal Accidents for Worker in GBs.**  
Source: Health & Safety Executive (2018) [30]



**Figure 5: Standardized Incidence Rates [per 100,000 Employees] of Fatal Injuries at Work for 2015 Across Countries.**  
Source: Health & Safety Executive (2018) [30]

Figure 2 shows that out of the six top industrial sectors reported, *waste and recycling* recorded the highest accident rates with 10.26 out of every 100,000 workers; *agriculture* was second with 8.44 out of every 100,000 workers; *construction* was third with 1.64 out of every 100,000 workers; *transportation* was fourth with 0.96 out of every 100 workers; and *manufacturing* was fifth with 0.52 out of every 100,000 workers—(Health & Safety Executive, 2018) [30].

Figure 3 which suggests, old age as a causal factor for accidents tends to validate the policy of pegging retirement age at 60 years. This also has psychological undertone. Empirical reports (Eggermont, 2014) [31] tend to posit that aging tend to come along with cell degeneration, especially of the nervous system that control reasoning, judgment and general movement. This probably explains why more older workers tend to be involved in accidents. The causes of accidents in workplaces highlighted in Figure 4 further support this notion. Data in Figure 4 shows that, out of the five identified highest causes of fatal accidents in Great Britain, four [80%] have strong psychological undertones – falls from a height, struck by moving vehicle, struck by moving objects, and contact with moving machinery. Virtually, all these causes have something to do with misjudgment, cognitive miscalculation, overconfidence and poor perception. These are all psychological traits that can be enhanced with training. The data in Figure 5 shows that, going by international comparison, Great Britain is among the countries in the world, with the lowest prevalence of accidents in the workplace, beaten only by Finland – (Health & Safety Executive, 2018) [30]

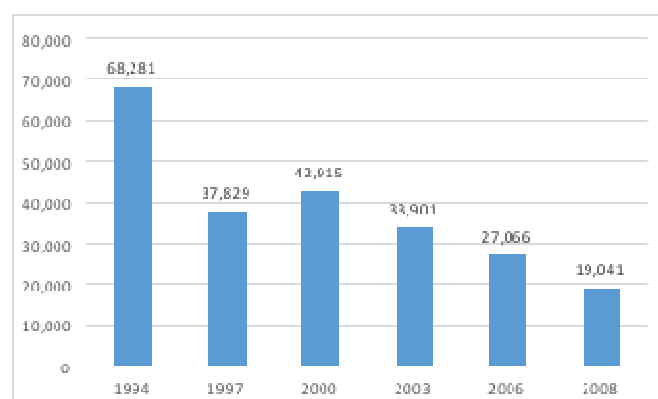
### 3.6 Industrial Accidents in Malaysia from 1994 to 2008

In a study conducted by Said, Said and Halim (2012) [32] on the determinants of industrial accidents in the Malaysian manufacturing sector, it was found that the manufacturing sector consistently recorded the highest record of accidents, almost 50% higher across board, from 1994 to 2008 than all other sectors.

**Table 1: Industrial Accidents by Sector in Malaysia [1994-2008]**

Sectors	1994	1997	2000	2003	2006	2008
Agriculture, forestry and fishing	27,268	24,390	13,293	8,796	5,739	3,962
Mining and quarrying	1,406	763	643	736	541	368
Manufacturing	68,281	37,829	42,915	33,901	27,066	19,041
Electricity, gas, water and sanitary services	588	372	592	513	515	524
Construction	4,536	3,648	4,966	5,113	4,500	3,814
Trading	9,173	9,248	15,472	13,576	11,783	11,342
Transportation	4,437	3,276	4,800	4,142	3,653	3,305
Financial institution	592	367	7,293	6,195	5,386	718
Real estates, renting and business services	2,830	3,731	6,581	5,617	4,832	4,405
Total <sup>1</sup>	125,506	89,049	98,281	81,003	68,008	56,095

Source: Said, Said and Halim (2012) [32]



**Figure 6: Industrial Accidents in Manufacturing Sector, Malaysia, (1994 to 2008).**

Source of Data: Said, Said and Halim (2012) [32] Designed by: Odukoya (2019b) [33]

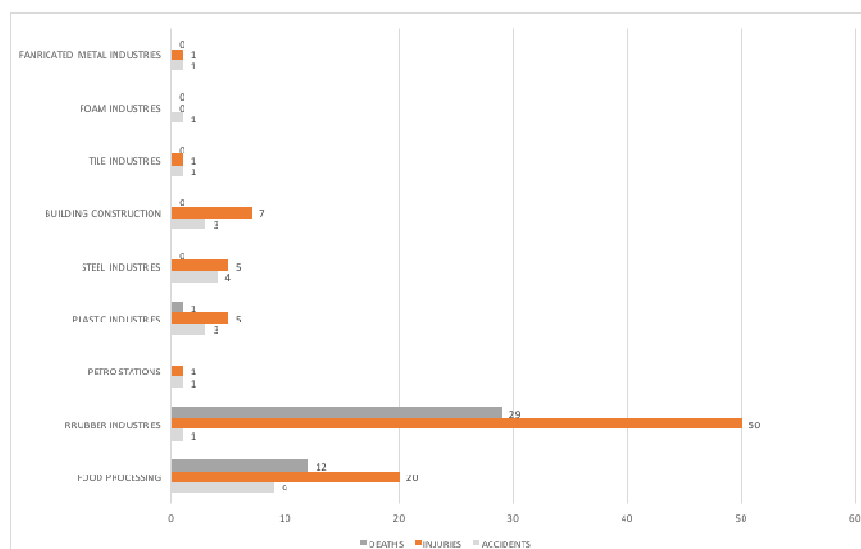
Table 1 shows that the manufacturing sector consistently featured more accidents than all other Malaysian industrial sectors in 1994 and 2008. Figure 6 shows a remarkable drop in prevalence of accidents over the period reviewed.



Mansor *et al.*, (2011) [34] survey show that stress and fatigue, unsafe action, machinery and tools, design of workplace, training procedures are among the significant factors that contribute to workplace accident. Consistent with previous studies, this study found that large manufacturing firms are more capable of controlling accidents at workplace when compared with small firms largely because of greater level of awareness on OSH matters (Rampal and Nizam, 2006) [35].

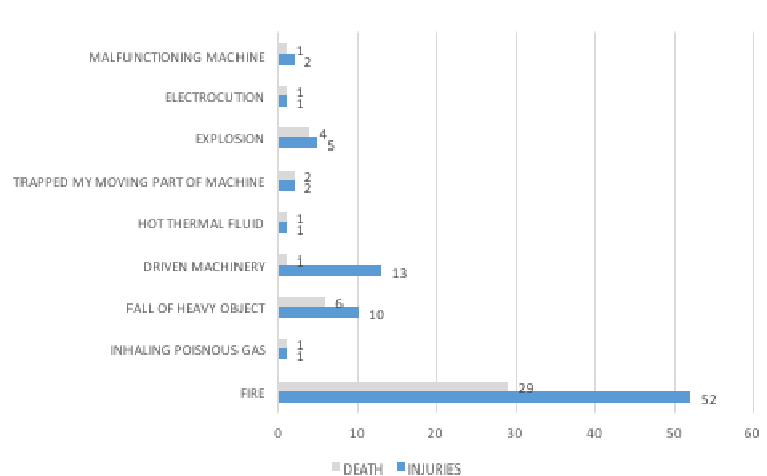
### 3.7 Pattern of Occupational Accidents and Causal Factors in Nigerian Factories

Umeokafor, Evaggelinos, Lundy, David, Allan, Igwegbe, Umeokafor and Umeadi (2014) [36] investigated the pattern of occupational accidents and their causal factors in Nigerian factories. Accident data for a period of 11 years (2002 - 2012) was collected from the Federal Ministry of Labour and Productivity Inspectorate Division (FMLPID). Findings from the study suggest serious under-reporting of accidents for the 11-year study period, with only 40 accidents reported in 11 years.



**Figure 7: Accidents and Deaths in Nigerian Industries [2000-2012].**

Source: Umeokafor, Evaggelinos, Lundy, David, Allan, Igwegbe, Umeokafor and Umeadi, 2014; Designed by Odukoya (2019b) [36; 33]



**Figure 8: Causes of Accidents and Deaths in Nigerian Industries [2000-2012].**  
Data Source: Umeokafor, Evaggelinos, Lundy, David, Allan, Igwegbe, Umeokafor and Umeadi, 2014; Designed by Odukoya (2019b) [40; 33]

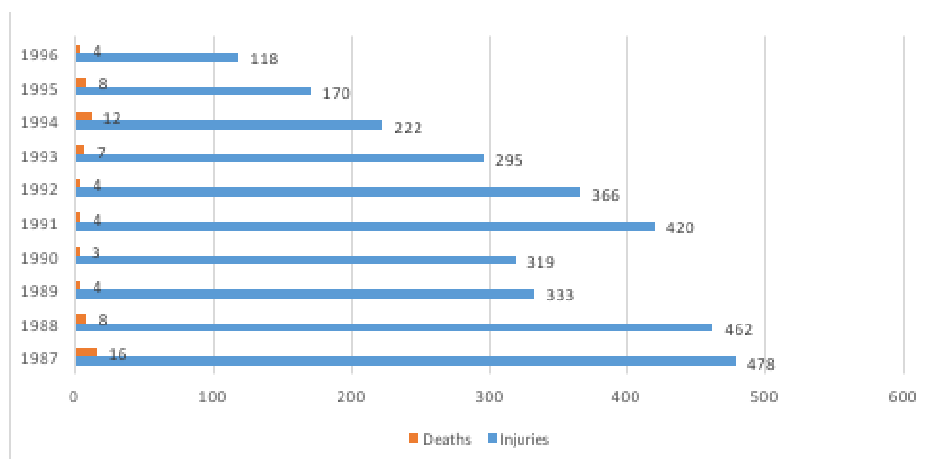


### 3.7.1 Causes

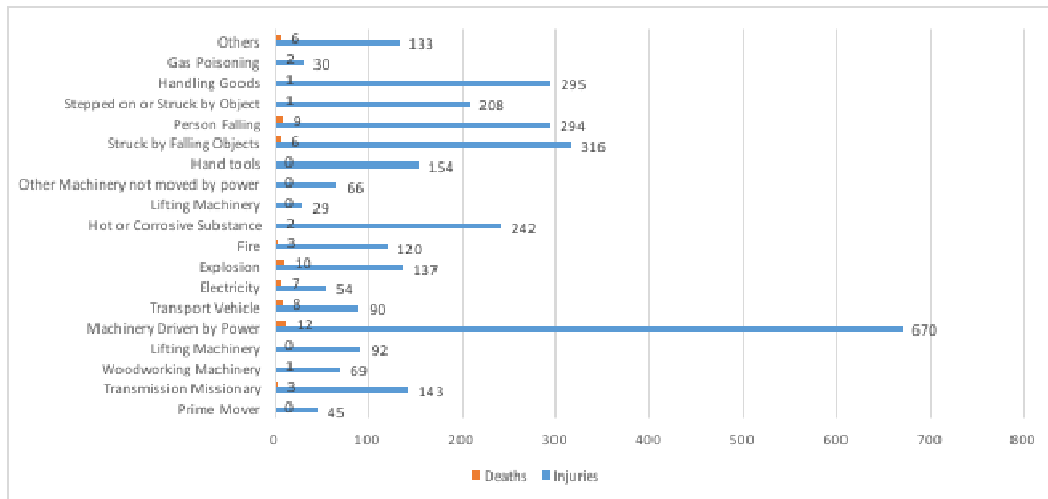
- Fire is the greatest cause of *reported injuries* in Nigerian industries [52 injuries] – Figure 8
- Fire is also the greatest cause of *death* in Nigerian industries [29 injuries] – Figure8
- This was followed by power-driven machineries [13 injuries] and fall of heavy objects [10 injuries] – Figure8
- Lack of training in the workplaces in another major cause of accidents.
- Delayed or poor justice, partly because the process of prosecution is cumbersome also contribute to accidents as Business owners often look for ways to cut cost at the risk of safety of their workers.
- The cumbersome process of reporting accidents may be a contributory factor to the low level of accident reporting in Nigeria.
- Some companies do not report accidents because they want to avoid compensating victims.
- Seventy-eight [78%] of the accidents reported in Nigerian Industries during the 11-year period could largely be attributed to management's negligence.
- Umeokafor et al, (2014) [36] also reported that 80% of the accidents occurred at night.
- Industries in the *rubber manufacturing sector* recorded the highest number of injuries (50); followed by Food Processing industries (20).See Figure7.

### 3.7.2 Fatal Injuries in Nigerian Factories

In a study of fatal injuries in Nigerian factories, Ezenwa (2001)[37] analyzed data from 1987 to 1996collected from the Nigerian Federal Ministry of Labour and Productivity Inspectorate Division(FMLPID). Some of the core findings are highlighted below:



**Figure 9: Annual Distribution of Injuries and Deaths in Nigerian Factories [1987-1996].**  
Source: Data from Ezenwa (2001) [37]; Designed by Odukoya (2019b) [33]



**Figure 10: Causes of Injuries and Deaths in Nigerian Factories [1987-1996].**

**Source:** Data from Ezenwa (2001) [37]; *Designed by* Odukoya (2019b) [33]

The Factories Act made it mandatory for all Factories in Nigeria to report occupational accidents to the Factory Inspectorate Department [FID] of the Federal Ministry of Labour and Productivity [FMLP] using the statutory accident notification forms. This data for this study was collected from the FMLP.

### 3.7.3 Findings

- Machinery driven by power tends to constitute the highest cause of injury (670) and death (12).
- Being struck by moving object was the second highest cause of accidents, while explosion was the second highest cause of death.
- With the exception of 1989 and 1990, the number of accidents tend to steadily decrease over the years, from 478 in 1987 to 113 in 1996.

### 3.8 Accidents in Thailand Industry between 2001 and 2017

According to Tungjirattitikan, (2017) [8], Thailand had 39,501 registered factories in 1974 and 95,510 factories in 1984. The industrial growth seems to come along with attendant increasing factory-related accident.

**Table 2: Number of Industrial Accidents in Thailand from 2001 to 2016**

Year	Number of Accidents				Total
	Fire	Explosion	Toxic release	Others	
2001	12	6	0	1	19
2002	50	5	3	9	69
2004	69	14	11	12	106
2005	42	6	7	5	60
2006	50	17	9	9	85
2007	25	4	4	9	42
2008	6	6	5	6	23
2009	17	1	1	5	24
2010	14	2	5	2	23
2011	11	0	0	6	17
2012	30	3	6	7	46
2013	50	7	6	17	81
2014	79	13	18	15	125
2015	81	7	7	10	105
2016	107	7	17	23	154

### 3.8.1 Findings

Though the highest rate of accidents was in 2016 (154), the next highest rate of accidents were recorded in 2014 (125), 2004 (106) and 2015 (105) respectively. This implies there was no consistent pattern in the frequency of occurrence of accidents. However, with high rates of accidents featuring in the last three years, it can be adduced that the rate of industrial accidents in Thailand is on the increase. This observation was corroborated by Tungjirathitikan, (2017) [8] when he reported that the number of Thailand workers affected by accidents increased almost 10 times from 4,023 in 1974 to 41,056 in 1984.

### 3.8.2 Causes

Tungjirathitikan (2017) [8] noted that the causes of the major accidents in Thailand factories could be attributed to unprofessional handling of instruments, gadgets, and machines. In many small-scale industries, the entrepreneurs sometimes do not have sufficient financial resources to replace malfunctioning machines. This often causes machine operation errors that lead to unexpected accidents. This is the limitation of education. Numerous workers do not have enough professional skill or knowledge to operate factory machineries. The last weakness is the deficiency of the safety system, or disregard of safety rules. These are often classified as human errors (Tungjirathitikan, 2017) [8]

## 4. SUMMARY OF FINDINGS & DISCUSSIONS

### 4.1 What is the Prevalence of Accidents in Manufacturing Industries around the World?

Some of the studies were not nationally based, while some national studies did not furnish sufficient data to justify comparability. An example here is Nigeria's data. The data was scanty. Umeokafor *et al* (2014)[36] attributed this to low level of publicity and some company management's penchant for avoiding compensating victims.

There was also the challenge of inconsistent data. For instance, Ezenwa(2001) [37] reported 3,183 injuries and 71 deaths in Nigerian manufacturing industries between 1987 and 1996; while Umeokafor *et al* (2014)[36] reported 93 injuries and 46 deaths in Nigerian Industries between 2002 and 2012. How can we reconcile the yawning gap between 3,183 injuries with 93 injuries within virtually the same time range of 10 years? Could the Nigerian government have been so pragmatic as to curb accidents in this sector within 6 years [1996 to 2002]?

The prevalence rate gleaned from the reviewed studies were not on the same scale. Virtually all the countries under review used different scales of reporting, thus preventing comparison. The best nationally comparable data was featured in the Great Britain report. [Figure 5]. From this chart, Romania, followed by France recorded the highest prevalence of accidents in manufacturing industries while Finland, followed by Great Britain had the lowest accident occurrences. There is clearly a need to evolve a more reliable unified internationally acceptable parameters for reporting and collating accidents in workplaces to allow for international comparison.

### 4.2 What are the Categories of Causes of Accidents in Manufacturing Industries?

**Table 3: Categorization of Causes of Accidents in Manufacturing Industries**

S/N	Categorized Causes	Sub-Categories
	<b>Financial/Economic</b>	
1	Entrepreneurs sometimes do not have sufficient financial resources to replace ailing malfunctioning machines	
	<b>Mechanical</b>	

Table 3: Contd.,		
2	Poor design of workplace	
3	Lack of protective devices	
4	Construction with shoddy building materials cum weak pillars	
5	Sub-standard factory machines cum poor maintenance	
6	Deficiency of the safety system	
<b>Psychological</b>		
7	Factory owner's negligence with regard to following the building code	<i>Cognitive</i>
8	Lack of training in the workplaces. Poor training programs due to poor education.	<i>Cognitive</i>
9	Delayed or poor justice, partly because the process of prosecution is cumbersome	<i>Psycho-social</i>
10	Inadequate work procedure often leading to stress.	<i>Cognitive</i>
11	Workers not having enough professional skill or knowledge to operate factory machineries	<i>Cognitive&amp; EI [Emotional Intelligence]</i>
12	Raw materials storage on the ground floor in close proximity to high voltage electricity transformers	<i>Cognitive&amp; EI</i>
13	Expired fire safety certificate	<i>Cognitive&amp; EI</i>
17	Lack of adequate fire safety training	<i>Cognitive&amp; EI</i>
	Inadequate cum expired fire extinguishers & fire defense materials	<i>Cognitive&amp; Emotional Intelligence</i>
14	"A number of officials reported that the building showed cracks a day before its collapse, but the owner dismissed it as nothing serious"	<i>Cognitive&amp; Emotional Intelligence</i>
15	Falls from a height	<i>Cognitive</i>
16	Struck by moving vehicle or object	<i>Cognitive</i>
17	Contact with moving machinery	<i>Cognitive</i>
18	Old age	<i>Developmental challenge</i>
19	Stress	<i>Psychomotor cum metabolic overload</i>
20	Fatigue; 80% of the accidents occurred at night (Umeokafor et al, 2014)	<i>Psychomotor cum metabolic overload</i>
21	Unsafe action	<i>Cognitive&amp; EI</i>
22	Disregard of safety rules.	<i>Cognitive&amp; EI</i>
23	Human errors	<i>Cognitive</i>
24	Lack of emergency exits	<i>Cognitive&amp; EI</i>
25	Lack of safeguards and safety devices	<i>Cognitive&amp; EI</i>
26	<b>Others</b> [unclassified]	
<b>Source:</b> Odukoya (2019b) [33]		

From **Table 3**, four categories of causes are identified: Financial/Economic, Mechanical, Psychological and Others.

#### 4.3 What Proportion of the various Factors Attributed for Accidents in the Manufacturing Industries is Psychological?

Nineteen [19] out of the twenty-six [26] identified causes of accidents in manufacturing industries had psychological undertone [73%]. Virtually all these causes have something to do with poor judgment, miscalculation, overconfidence, poor perception and low emotional intelligence.

Gordon (2019) [38] identified the seven core causes of accidents in workplaces: Shortcuts, overconfidence, lack of housekeeping, starting a task before getting all necessary information, neglecting safety procedures, mental distractions and lack of preparation. Reddon (2019) [39], however, identified lifting, fatigue, stress, dehydration, poor lighting, hazardous materials, workplace violence, trips and falls are the most common causes of workplace accidents. You will notice virtually 90% of the items listed here have psychological undertone. These submissions tend to corroborate the finding in this study that 73% of the causes of accidents in manufacturing industries around the world could be attributed to psychological deficiencies, since they are largely human factors.

#### **4.4 What are the Dimensions of Psychological Factors Responsible For Accidents in Manufacturing Industries?**

- **Overconfidence** – Many of the workers were over-confident. They felt they cannot be victim of accident in the workplace. This is often the commonest psychological reason for accidents, in virtually all areas of human endeavor.
- **Poor Cognitive Processing cum Low Intelligence Quotient**– This could be attributed to low quality of education and general poor training. It could also be connected with low IQ.
- **Personality cum Psychological disorder** – For example, the owner of *Tazreen Fashions Limited* in Bangladesh, who built a 9 floor-structure on a marshland without an approved building plan for 3 floors, and still encouraged placement of heavy industrial machineries on the topmost floors is likely to be a case of mental disorder.
- **Mental Degeneration as a result of aging** – This often lead to poor judgment, miscalculations, general weakness that often culminate in poor handling of objects or machineries. Aged people should hardly be allowed to handle sensitive or dangerous machineries.
- **Psychomotor cum Metabolic Overload** – Stress and fatigues often set in; when the body's metabolic activities are overstretched often due to lack of adequate rest, financial challenges, emotional turmoil and physical exertions. These trend could naturally lower mental alertness, hence the increasing tendency of accidents often experienced with such people.

#### **4.5 Which of the Psychological Precursors of Accidents in Manufacturing Industries are Preventable?**

Virtually all the psychological-oriented causes are preventable.

### **5. CONCLUSIONS & RECOMMENDATIONS**

This study reviewed some of the notable articles on causes of accidents in manufacturing industries. The focus of this study is to glean the psychological undertones to the causes. In the process, it was found that there was hardly uniformity in the parameters of reporting accidents across the nations, hence making it difficult to make reliable international comparison. This point nonetheless, the submissions of Gordon (2019) [38] best summarize the deductions from this review. He noted that it is better to be careful 100 times than to get killed once. Virtually, 80 out of every 100 accidents that happen in the workplace are ultimately the poor perception, poor judgment or overconfidence on the part of the victim(s) or the entrepreneurs. It is predominantly people problem. Consequently, the causes of accidents in manufacturing industries is predominantly psychological. It was reiterated that after 150 years of research, fatigue appears to still be the major cause of

accidents in workplaces (Gordon, 2019) [38], contributing at least 85% of accidents. Virtually, all the psychological causes are preventable with proper psychological screening and training of entrepreneurs, factory managers, factory workers, combined with astute supervision.

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